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Original Research Article

Effect of Exercise on Untreated and Treated Hypertensive Patients in Babylon Province

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Abstract

Normal blood pressure at rest is diastolic a range of 60-90 mmHg and systolic 100-140 mmHg. Hypertension is chronic elevated arterial systolic blood pressure > 140 mmHg, and diastolic blood pressure > 90 mmHg. Epidemiological indicate studies that elevated blood pressure leads to strike, heart coronary disease, congestive failure heart and end stage of renal disease. There are two types of hypertension; primary (essential) of cause unknown which includes more than 95% of all cases of hypertension, and secondary hypertension which is due to underlying disorder it accounts less than 5% of hypertensive cases.

Response to moderate exercise protocol in hypertensive patients. To study the effect of exercise on systolic, diastolic, and lipid profile elements in treated and untreated hypertensive patients.

The study was conducted in Marjan medical city in Hilla from April to September 2015. The random sample of 30 patients of hypertension including 16 males and 14 females, their ages from 40 -60 years. Regular treated patients were 23, none treated 7. Patients were recruited from outpatient clinic. History and physical examination were obtained from all patients. Lipid profile tests, BMI, measurement of blood pressure were performed before and after exercise.

Key words: Hypertension, Exercise, Blood pressure, Walking, Systolic, Diastolic.

الخلاصة

ضغط الدم الاعتيادي اثناء الراحة يتراوح من 100 –140 ملم زئبقي اثناء انقباض القلب ومن 60 –90 ملم زئبقي اثناء انبساط القلب. ارتفاع ضغط الدم هو ارتفاع مزمن لأكثر من 140 ملم زئبقي اثناء انقباض القلب واكثر من 90 ملم زئبقي اثناء انبساط لأشخاص البالغين. الدراسات الوبائية اكدت ان ارتفاع ضغط الدم يؤدي الى السكتة الدماغية ، امراض القلب الإكليلية عجز القلب الاحتقاني والطور النهائي لمرضى المجاري البولية. يوجد نوعين من ارتفاع الضغط: الاول اساسي غير معروف السبب ويشكل حوالي اكثر من 95 % من حالات ارتفاع ضغط الدم والثاني ثانوي يسبب اختلال تحتي ويشكل حوالي اقل من 5 % من حالات ارتفاع الضغط.

لدراسة تأثير التمرين على الضغط الانقباضي والانبساطي وصور الدهون لدى مرضى فرط الضغط المعالجين و غير المعالجين.

البحث انجز في مستشفى مرجان التعليمي / الحلة من نيسان الى ايلول من عام 2015. لعينه عشوائية تضم 30 مريضا يعانون فرط ضغط الدم تشمل 16 ذكرا و 14 انثى. تراوحت اعمارهم من 40 الى 60 سنه. المرضى المعالجون بصوره منتظمة بلغ 23 مريضا وغير المعالجون 7 مريضا. جميع المرضى تطوعوا من العيادة الخارجية.

الكلمات المفتاحية:ارتفاع ضغط الدم، تمرين، ضغط الدم،المشي، انقباضي، انبساطي.

Introduction

Normal blood pressure at rest is range of 60-90 mmHg diastolic and 100-140mmHg systolic. Hypertension was presenting if blood pressure is persistently above 140/90 mmHg[1].

Hypertensionischronic elevation of blood pressure (BP) > 140/90 mm Hgatrest, remains one of the most factors risk for cardiovascular disease (e.g.artery coronary disease, failure heart,stroke)[2].

Hypertension is rarely accompanied by any symptoms. Some high thepressureblood report headaches (particular the back of the head in the morning), also vision or fainting episodes[3].

The various types of hypertension are **primary**(idiopathic or essential) hypertension ofcauseunknown. More than 95% of hypertensions are in those category. **Secondary** hypertension is systemic hypertension due to underlying disorder. It accounts for <5% cases of the hypertension[4].

Several factors influence primary hypertension. These factors include: Genetics, high intake salt, insulin resistance, sympathetic nervous system, low physical activity, and obesity[5]. In the United States, more than 50 million peoples have blood pressure (BP) more than optimal level (120/80 mm Hg), only approximately half of them receive treatment (antihypertensive drugs) tocontroland decrease their BP to less than 140/90 mm Hg[6]. It is now well accepted that increased degree of physical activity and duration was associated with a reducing incidence of the hypertension[7]**.**

The British Hypertension Society2011has defined range of blood pressure which falls within the normal range and those that indicate hypertension **(**Table1**).**

Table 1: The normal range of BP and hypertension.(Guidelines Committee 2003)

Type	DBP (mmHg)	SBP (mmHg)
Optimal	< 80	< 120
Normal	< 85	< 130
High normal	85-90	130-139
Mild hypertension	90-99	140-159
Moderate hypertension	100 – 109	160 – 179
Sever hypertension	≥ 110	≥ 180

SBP = Systolic blood pressure. DBP = Diastolic blood pressure.

Loss weight and physical exercise. Those have all been shown to significant decrease blood pressure in people with hypertension[8].

Oxidant stress alters many function of endothelium, including tone vasomotor, inactivate of nitric oxide (NO) by superoxide and other reactive oxygen species (ROS) seem to occur in conditions like hypertension[9].

Hypertension increases the risk of strokes, Aortic aneurysms, diffuse atherosclerosis, chronickidney disease, and pulmonaryembolism[10]. When exercise is performed on a treadmill, three times per week for 12 weeks. Diastolic ABP wasdecreased by 8 mmHg ($p < 0.001$) Systolic ABP was decreased by 12 mmHg ($p < 0.001$)[11].

Exercise training program

Aerobic exerciseappears to be increase effective at lowering blood pressure from other types of exercise. Aerobicactivitiesinclude walking,cycling,and cycling seems to be the more effective. Moderate exerciseintensity seems to be the more effective for decreasing blood pressure in the hypertensive patients. These should be equivalent to ≈1.5 mile per day[12]. Walking has been found to be a suitable low intensity exercise that is recommended for hypertensive individuals[13]**.**

Moderate exercise lowered blood pressureandthis type of exercise also

decreased weightbody, fatbody and waist circumference[14].

The physiological response to exercise are dependents on the duration, intensity, and frequency as well environmental conditions[15].

Mechanisms of exercise-induced decrease in blood pressure

1-Hemodynamic mechanism; it reduce speripheralvascular resistance [16].

2-Exercise training have been shown to reduce activitySNS and to increase vagal reflex[17].

3-The exercisecontribute vascular endothelium to release of vasodilatingfactor[18].

Materials and Methods

The present study was conducted at Marjan Teaching city in Hilla, during period from April to September 2015. The random sample of 30 patients of hypertensive patients included (16 male,14 female) and their age from 40 -60 years. Regular treated patients were 23, non-treatedpatients were 7. Patients were recruited from outpatient clinic. A history and physical examination were obtained and laboratory tests were performed in all patients before and after 8 weeks of aerobic exercise.

Exercise program

Low to moderate intensity exercise such as walking 30 minutes per day (equivalent to ≈1.5 mile) for 5 days per week for 8 weeks[12].

Measuring blood pressure, auscultatory method

An inflatable cuff attached to a manometer mercury (sphygmomanometer) ware aroundwrapped the arm and a stethoscope are places on the arterybrachial at elbow. The cuff ware rapidly inflated until the pressure in it is above the expected systolic pressure in the brachialartery. The pressure in the cuff was then lowered slowly. The cuff pressure at which the sounds were first heard (Korotk off sound phase 1), was the systolic pressure (SBP). Diastolic blood pressure (DBP) was taken when the sound disappears (Korotk off sound phase 5)[19].

Figure 1: Ausculatory method for measuring systolic and diastolic blood pressures (Marjan medical city).

Laboratory analyses

After 14 hours fast, a venous fresh blood sample of 4 ml was obtained. Blood was centrifuged and the collected serum was investigated for total serum cholesterol, serum HDL and serum triglyceride, by standard enzymatic methods. LDL cholesterol were calculated by the use of the formula Friede wald:

Total cholesterol= LDL +HDL +VLDL

VLDL = Triglyceride / n, where n = 5[21].

Measurement of body mass index (BMI)

Weightbodywere measured in lightclothingto the nearest 0.1 kg with a balance calibrated scale and height not

present shoes were measured to nearest 0.5 cm using a rulervertical. Massbody index was computed weight divided by height squared (Kg/ m^2)[22].

Statistical Analysis

Statistical analysis were carried out uses SPSS version 17. variables Categorical was presented as percentage and frequency. Continuous variables was presented as (SD ±Means). Paired t-test was used to determinant significant difference between before and after to all variables under the study. A p-value of ≤ 0.05 was considered as significantly[23].

Results

Distribution of hypertensive patients according to demographic characteristics

Table(1) shows the distribution of hypertensive patients according to demographic characteristics including (mean age and gender).

Table 1: Distribution of hypertensive patients according to gender variables

Gender	No.of hypertensive patients	Mean age(years) Mean ± SD	%
Male	16	54±7.11	53.3%
Female	14	49.35±6.76	46.7%
Total	30		100.0 %

*SD standard deviation

Mean differences of diastolic and systolic blood pressure before and after two months of regular exercise

Table (2) shows mean differences of diastolic and systolic blood pressure (mmHg) before and after two months of regular exercise among hypertensive patients. There were significant differences between means of diastolic and systolic blood pressure before and aftertwo months of regular exercise among hypertensive patients.

Table2: Mean differences diastolic and systolic blood pressure (mmHg)before and after regular exercise among hypertensive patients

Variable	Categories	N	Mean ± SD	Normal value	P value
Systolic blood pressure (mmHg)	Before exercise	30	154.46 ± 12.28	**<130**	**<0.001****
	2 months after exercise	30	150.53 ± 11.34		
Diastolic blood pressure (mmHg)	Before exercise	30	92.16 ± 12.16	**<85**	**<0.001****
	2 months after exercise	30	87.40 ± 10.65		

*p value ≤ 0.05 was significant.

Mean lipid Profile elements before and after two months of regular exercise among hypertensive patients

Table (3) shows mean differences of lipid profile elements including (total serum cholesterol, triglyceride, HDL, LDL and VLDL) before and after two months of regular exercise among hypertensive patients. There were significant differences.

Table 3: Mean differences lipid profile elements before and after regular exercise among hypertensive patients

Variable	Categories	N	Mean ± SD	Normal value	P value
Total serum cholesterol (mmol/L)	Before exercise	30	5.046 ± 0.81	**3.6-5.4**	**<0.001****
	2 months after exercise	30	4.633 ± 0.79		
Serum triglyceride (mmol/L)	Before exercise	30	2.66 ± 1.16	**0.8-2.1**	**<0.001****
	2 months after exercise	30	2.47 ± 1.15		
HDL (mmol/L)	Before exercise	30	0.67 ± 0.23	**<0.9**	**<0.001****
	2 months after exercise	30	0.84 ± 0.24		
LDL (mmol/L)	Before exercise	30	3.80 ± 0.74	**1.5-4.1**	**<0.001****
	2 months after exercise	30	3.29 ± 0.73		
VLDL (mmol/L)	Before exercise	30	0.53 ± 0.23	**Up to 0.8**	**<0.001****
	2 months after exercise	30	0.49 ± 0.23		

*p value ≤ 0.05 was significant.

Mean differences of diastolic and systolic blood pressure before and After Two Months of Regular exercise among hypertensive patients on regular treatment (n=23)

Table (4) shows mean differences of diastolic and systolic blood pressure (mmHg) before and after two months of regular exercise among hypertensive patients on regular treatment. There were significant differences between means of diastolic and systolic blood pressure before and after two months of regular exercise among hypertensive patients on regular treatment.

Table 4: Mean differences diastolic and systolic blood pressure (mmHg) before and after regular exercise among hypertensive patients on regular treatment

Variable	Categories	N	Mean ± SD	Normal value	P value
Systolic blood pressure (mmHg)	Before exercise	23	156.30 ± 12.81	**<130**	**<0.001****
	2 months after exercise	23	152.21 ± 11.81		
Diastolic blood pressure (mmHg)	Before exercise	23	91.26 ± 13.44	**<85**	**<0.001****
	2 months after exercise	23	86.60 ± 11.83		

*p value ≤ 0.05 was significant.

Mean differences of lipid profile elements before and after two months of regular exercise among hypertensive patients on regular treatment (n=23)

Table (5) shows mean differences of lipid profile elements including (total serum cholesterol, triglyceride, HDL, LDL and VLDL) before and after two months of regular exercise among hypertensive patients on regular treatment. There were significant differences between means of lipid profile elements before and after two months of regular exercise among hypertensive patients on regular treatment.

Table 5: Mean differences lipid profile elements before and after regular exercise among hypertensive patients on regular treatment. See figure

Variable	Categories	N	Mean ± SD	Normal value	P value
Total serum cholesterol (mmol/L)	Before exercise	23	4.98 ± 0.85	3.6-5.4	<0.001**
	2 months after exercise	23	4.54 ± 0.83		
Serum triglyceride (mmol/L)	Before exercise	23	2.65 ± 1.01	0.8-2.1	0.001**
	2 months after exercise	23	2.48 ± 1.01		
HDL (mmol/L)	Before exercise	23	0.70 ± 0.25	<0.9	<0.001**
	2 months after exercise	23	0.86 ± 0.27		
LDL (mmol/L)	Before exercise	23	3.72 ± 0.80	1.5-4.1	<0.001**
	2 months after exercise	23	3.18 ± 0.77		
VLDL (mmol/L)	Before exercise	23	0.53 ± 0.20	Up to 0.8	0.001**
	2 months after exercise	23	0.49 ± 0.20		

Mean Differences of Diastolic and Systolic Blood Pressure Before and After Two Months of Regular Exercise among untreated Hypertensive Patients (n=7)

Table (6) shows mean differences of diastolic and systolic blood pressure (mmHg) before and after two months of regular exercise among untreated hypertensive patients. There were significant differences between means of diastolic andsystolic blood pressure before and after two months of regular exercise among untreated hypertensive patients.

Table 6: The mean differencesdiastolic and systolic blood pressure (mmHg)before and after regular exercise among untreated hypertensive patients.

Variable	Categories	N	Mean ± SD	Normal value	P value
Systolic blood pressure (mmHg)	Before exercise	7	148.42 ± 8.46	**<130**	**0.026***
	2 months after exercise	7	145.00 ± 8.00		
Diastolic blood pressure (mmHg)	Before exercise	7	95.14 ± 6.30	**<85**	**0.017***
	2 months after exercise	7	90.00 ± 5.03		

*p value ≤ 0.05 was significant.

Mean Differences of Lipid Profile Elements Before and After Two Months of Regular Exercise among Untreated Hypertensive Patients (n=7):

Table (7) shows mean differences of lipid profile elements including (total serum cholesterol, triglyceride, HDL, LDL and VLDL) before and after two months of regular exercise among untreated hypertensive patients. There were significant differences between means of lipid profile elements before and after two months of regular exercise among untreated hypertensive patients.

Table 7: The mean differences lipid profile elements before and after regular exercise among untreated hypertensive patients.

Variable	Categories	N	Mean ± SD	Normal value	P value
Total serum cholesterol (mmol/L)	Before exercise	7	5.24 ± 0.66	3.6-5.4	<0.001**
	2 months after exercise	7	4.91 ± 0.63		
Serum triglyceride (mmol/L)	Before exercise	7	2.70 ± 1.66	0.8-2.1	<0.001**
	2 months after exercise	7	2.42 ± 1.62		
HDL (mmol/L)	Before exercise	7	0.58 ± 0.16	<0.9	0.003**
	2 months after exercise	7	0.76 ± 0.11		
LDL (mmol/L)	Before exercise	7	4.07 ± 0.47	1.5-4.1	0.002**
	2 months after exercise	7	3.66 ± 0.44		
VLDL (mmol/L)	Before exercise	7	0.54 ± 0.33	Up to 0.8	<0.001**
	2 months after exercise	7	0.48 ± 0.32		

*p value ≤ 0.05 was significant.

Discussion

There were significant (P-value < 0.001) differences between means of lipid profile elements before and after exercise among hypertensive patients, as shown in table 3-5. This result not agreement with [24] who mentioned that exercise rehabilitation lowered total cholesterol and LDL level by 5.2% P-value < 0.05 and 8% P value <0.01respectively because age of sample and nature of race different.

There were significant (P-value <0.001) differences between means of vital capacity before and after exercise among hypertensive patients on regular treatment as shown in table 3-7. Also there were significant (P-value <0.001) differences between means of systolic and diastolic blood pressure before and after exercise among hypertensive patients on regular treatment as shown in table 3-8. Because the ventilatory functions were increased in middle aged patients with hypertension [25].

There were significant (P-value <0.001) differences between systolic and diastolic blood pressure before and after exercise among hypertensive patients on regular treatment as shown in table 3-8. Because several recent clinical trials have demonstrated that physical activity reduces blood pressure in hypertensive patients[26].

There were significant (P- value <0.001) differences between means of lipid profile elements before and after exercise among hypertensive patients on regular treatment as shown in table 3-9. Because the result showed that there was statically significant difference among patients receive medicine in lipid levels. Therefore, it can be concluded that exercise were more effective In reducing lipids in over weight hypertensive postmenopausal women[27].

There were significant (P-value 0.026, 0.017) respectively differences between means of systolic and diastolic blood pressure before and after exercise among untreated hypertensive patients as shown in table 3-12. Because aerobic training induced significant decreased in systolic and diastolic blood pressure in hypertensive patients through reduction of vascular resistance [16].

There were significant (P-value <0.001, <0.001, 0.003, 0.002, < 0.001) decrease in serum TG, serum Cholesterol, serum LDL, increase in serum HDL, decrease in serum VLDL respectively in lipid profile elements before and after exercise among untreated patients as shown in table 3-13. Because physical activity increased fitness and decrease weight and body fat [16].

Conclusion

Systolic and diastolic BP in hypertensive patients showed significant decreases after mild-moderate exercise. Lipid profile of hypertensive patients showed significant decreases except HDL that showed significant increases after mild-moderate exercise.

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